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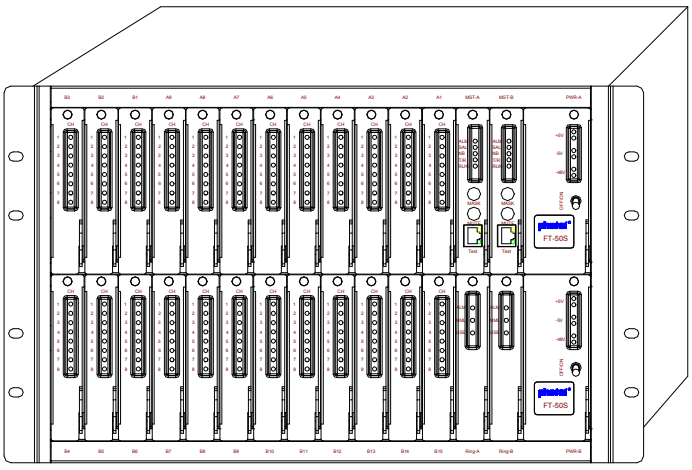
User Manual of
FT-50S (6U) PCM Multiplexer



Nanjing Photel Communication Technology Co., Ltd.

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1 Brief Introduction

FT-50S (6U) PCM Multiplexer adopts 6U high standard 19" rack. It supports multiple analog and data access, and fiber/electronic integration. The maximum 64Kbps access capacity of FT-50S (6U) PCM Multiplexer is 192, and the maximum E1 access capacity is 64.

FT-50S (6U) PCM Multiplexer can connect with other transmission equipment through its optical interface or standard E1 interface. It can realize point to point communication by E1 or optical interface; and it can execute D/I (drop/inset) function through its own 64E1 cross connection matrix; and it can realize PABX function with its relay card; and it can have online test functions including remote channel circuit test and subscriber line test.

FT-50S (6U) PCM Multiplexer is provided with a powerful NMS system, by which the operating status of the network can be monitored in real time and the functions including malfunction locating, time slot reassignment and online test can be performed easily. The NMS information transmission: the FT serial equipment can be cascaded through RS232 port if the equipment is located in the same room, and they can be connected through TS0 time slot of E1 when the equipment is located in different rooms. The NMS console can be connected with the devices directly via RS232 port or ETH port, and graphical interface NMS, command line NMS or SNMP NMS can be realized, which can improve the efficiency of network management into a high level.

FT-50S (6U) PCM Multiplexer has the following characteristics:

1.1 High density

The system capacity is 192 64K channels. The system can access up to maximum 64 E1 interface.

1.2 Abundant Access Interfaces

FT-50S (6U) PCM Multiplexer supports different types of user services: 64Kbps codirectional data and N×64Kbps synchronous data interface, 10/100M Ethernet interface, RS232 and RS485 asynchronous data interface, FXO, FXS, Hotline, Magneto, Carrier wave magneto interface and 2/4-wire E&M interface, etc.

1.3 Powerful Net Management System

It is convenient to set cross connection and the level of analog interface, and read the devices' settings by NMS

Automatic online test function can realize level test and signaling test for analog interface, functional test for data interface, functional tests of A/B ground, short circuit for 2-wire subscribers, it is very convenient to locate malfunction quickly and correctly through the NMS.

1.4 D/I (drop/insert) function

The D/I function can be configured by software, which make it very flexible to drop or insert channels.

1.5 PABX function

The PABX function can be realized by the Relay card, the relay card will support China No.1 signaling, No.7 signaling, PRI signaling and V5 signaling.

1.6 Optional OPT optical transmission unit

The OPT Optical transmission card can be selected by customer to reduce the equipment cost of the whole transmission system. The E1 interfaces of the equipment can be transmitted via optical interface. 8 E1 and 4 ETH will be transmitted via the OPT card, therein 4E1 will be transmitted directly, and the other 4E1 will enter 64E1 cross connection of the system.

1.7 Supper Reliability

All key cards adopt redundant backup and support hot swappable, including **power supply cards**, **ring supply cards** and **master cards**.

The FT-50S (6U) PCM Multiplexer adopts advanced circuit design and modular structure design, it uses low power consumption, high reliable components, and all functional cards support hot swap as well.

1.8 Unique ID card design

The ID card is fixed in the shelf; it can identify the equipment's ID, and store the configuration data file and dynamic operating data. So if changing other functional cards will not influence NMS to identify the equipment, which makes it more stable during switching master control card.

2 Operation Principle and Configuration

2.1 Operation Principle

FT-50S (6U) PCM Multiplexer conforms to ITU G.703, G.704, G.706 and G.715 standards, each Sub-Rack contains up to 24 Access Channel cards, and each access channel cards hold 8 access channels, so each Sub-Rack contains 192 access channels.

FT-50S (6U) PCM Multiplexer performs the digitalizing processing for the analogue audio signals, the transmitting system will multiplex the digital signals into standard E1 digital frame (these digital signals include the digitized signal from analogue interfaces and digital signal from the data interfaces.), multi-channel E1 signal will proceed 64K cross connection in the cross connection matrix. The output interface of the system is standard E1 or PDH optical interface. The receiving terminal will synchronize and decode the 2M signals, and proceed the reverse progress, and send the analogue audio signal or digital signal to the user.

NMS management can be performed for both remote equipment and local equipment. The master card (MST card) will provide two RS232 network interface. The NMS connection mode is very flexible, the local equipment can be cascade connected through RS232 interface, and the remote equipment can be connected by TS0 channel of E1 interface or private NMS channel. Every product has an exclusive serial number, and this number is used as identification code by NMS. The NMS platform can connect with any node of the network, and FT-50S (6U) equipment can be connected in the "Chain" or "Tree" topology. The NMS console can simultaneously monitor the status of any equipment that manufactured by our company in the same network.

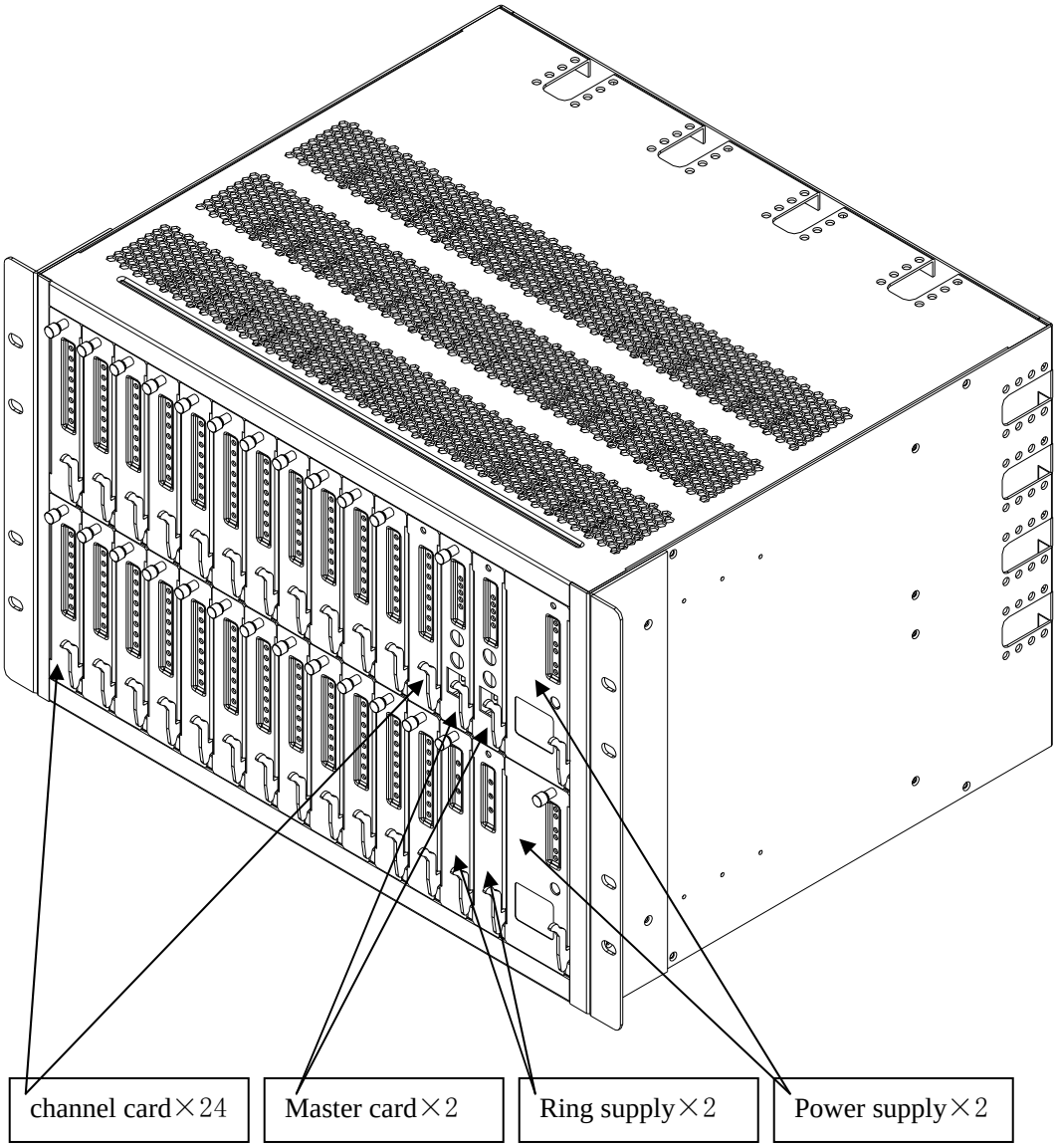
The power supply cards are mutually backup, to provide power of +5V, -5V for the system. The ring supply cards are also mutually backup which

generate the ring signal for FXS, HOT, MAG, Carrier wave interface and the test function.

The Master cards are also hot backup, and it will not influence the phone communication during switching the master cards.

2.2 System Configuration

FT-50S (6U) PCM Multiplexer can be configured with two power supply cards, two ring supply cards, two master cards (you may use one of them only to reduce the cost) and 24 Access Channel cards (the types and number of channel card are optional). The number and type of the Access Channel cards is according to the requirements. The system configuration is as detailed below.



Front view of FT-50S (6U)

2.2.1Power supply card

One power supply card can be chosen to reduce the cost or two power cards to get more reliability. The two power cards are hot backup mutually, so no switch time needed.

2.2.2Ring supply card

One ring supply card can be selected to reduce the cost or two ring cards to get more reliability. Because the ring card produces more heat when it is powered on, so the system will automatically switch off the ring card when the system doesn't need ring.

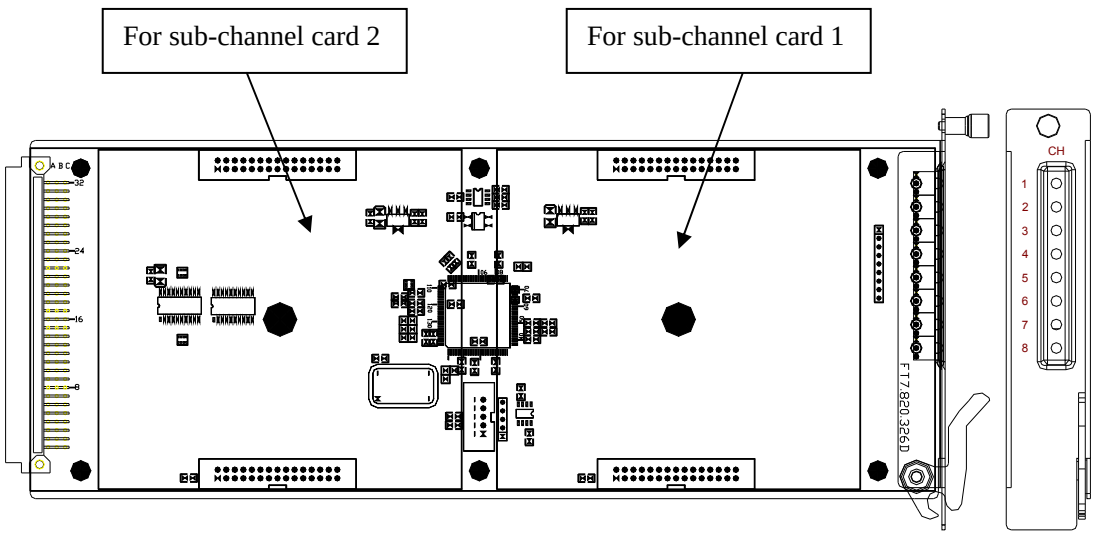
2.2.3Master card

One or two master card mode can be selected by user. The system will be more reliability when using two master cards, the master cards are back up mutually, no switch time need.

2.2.4Channel card

There are 24 channel card slots in the FT-50S (6U) PCM Multiplexer. One channel card can hold two sub-channel cards (any types of sub-channel card). Each sub-channel card has 4 audio ports or 4 64Kbps data ports or 4E1 ports or one FV35 port or one Ethernet port.

Two different types of sub-channel cards can be inserted into the same channel card. The channel card that inserted with E1 sub-channel card can be only plugged into slot A1 to A8 slots. And the other channel card can be plugged to any slot of the equipment.



Channel access card

There are eight LED on the panel of the channel card. The LED 1- 4 are corresponding to sub-channel card 1, and the LED 5 - 8 are corresponding to sub-channel card 2. Each LED has two colors: red and green. In application of 64Kbps services such as audio and low speed data communication, when the remote channel is absent, the LED will be red. When the remote channel is online, the red color will disappear. The LED will flash in green color when E or M of audio cards is effective, or the data card is running with low speed data.

If the sub-channel card is 4 E1 card, the LED will never be green. When the E1 interface produces LOSS or FA, the LED will be red.

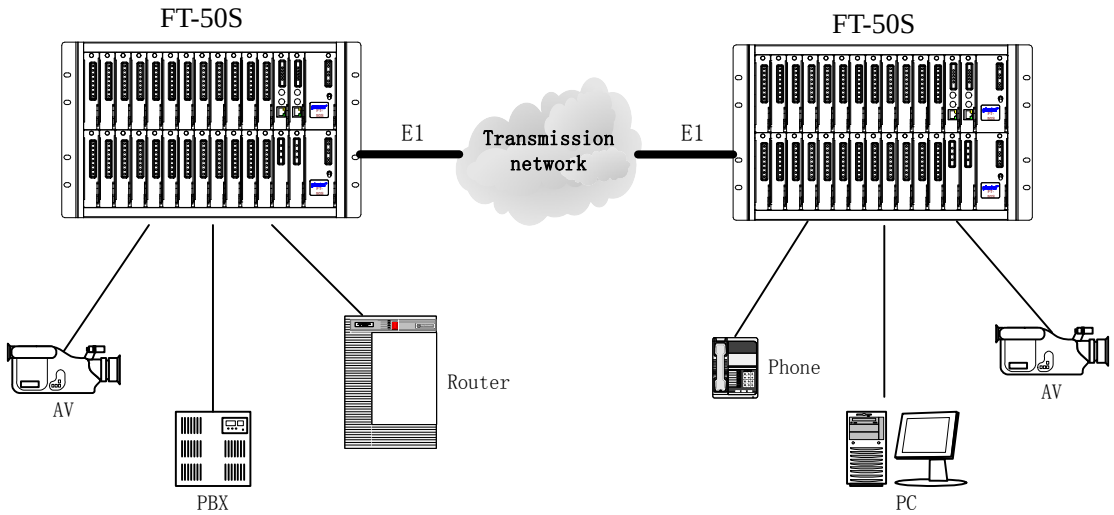
If the sub-channel card is N×64Kbps card, the LED will not be red. When its data is running, the led will be green.

If the sub-channel card is Ethernet card, the LED will not be red. When the Ethernet interface is connected successfully, the led will be green.

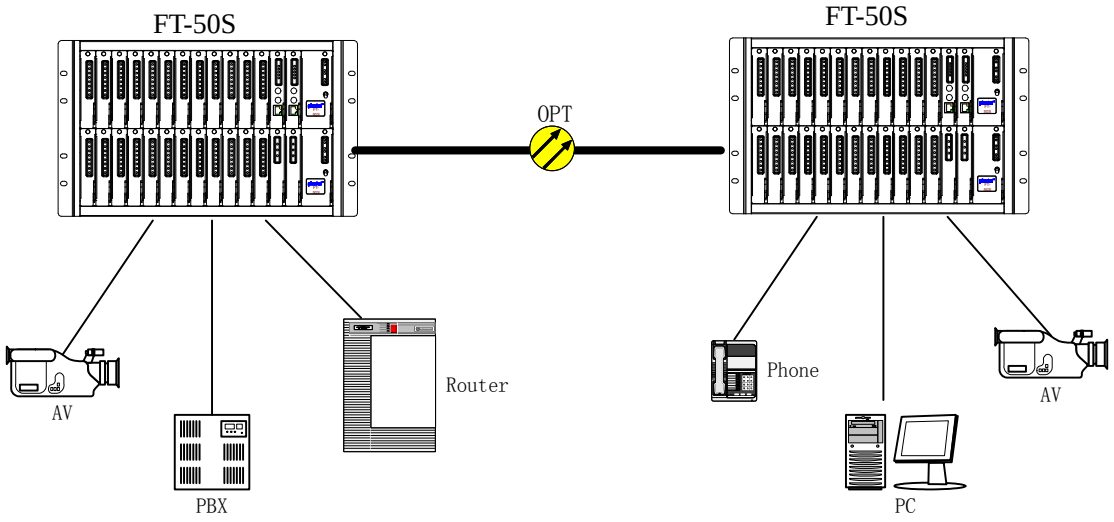
2.3 Application of Equipment

FT-50S (6U) PCM Multiplexer has the ability to build up flexible network.

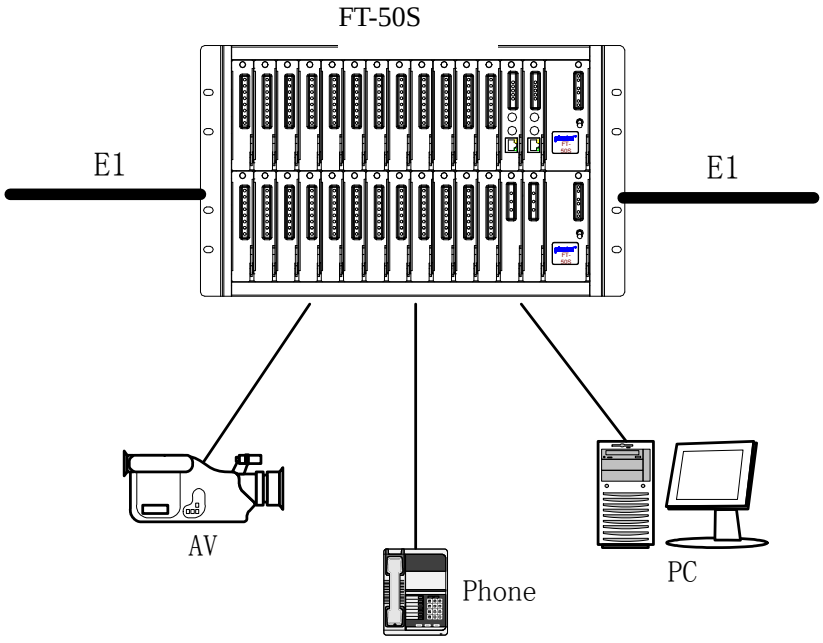
FT-50S (6U) PCM Multiplexer has flexible networking ability. The basic mode is point-to-point over optical fiber or over transmission network. It also can be used as Drop/Insert equipment. The transmission media between local station and remote station can be optical fiber, satellite or microwave equipment.



Communicating over transmission network



Point-to-point communicating over optical fiber



As a Drop/Insert equipment

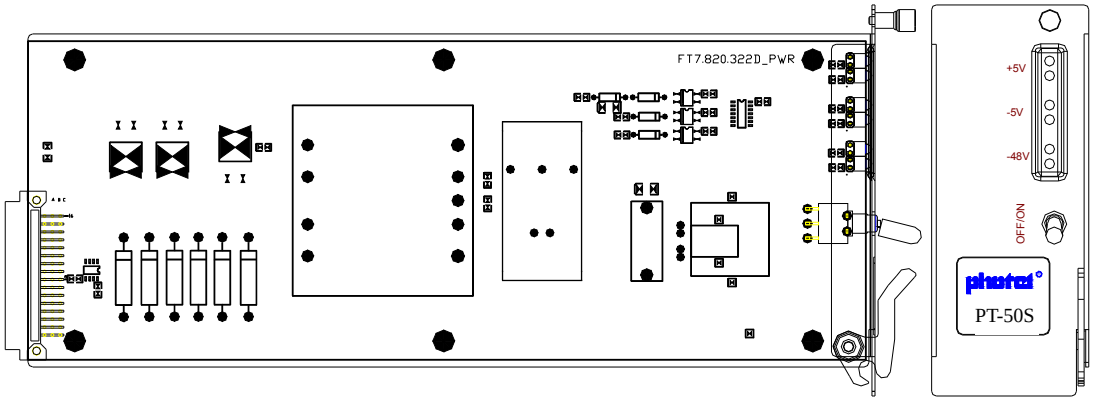
2.4 Equipment composition and operation

2.4.1Equipment composition

FT-50S (6U) PCM Multiplexer consists of the following unit cards: Power supply card, ring supply card, Master card, and Channel card. In normal situation, the Sub-Rack, power supply card and master card are basic configuration, and other access cards are optional according to the requirements. An ID card must be plugged into the backboard card. There are many types of data stored in the ID card. FT-50S (6U) must be equipped with ID card.

2.4.2Functions of unit cards and operation instructions

2.4.2.1 -48V Power supply card

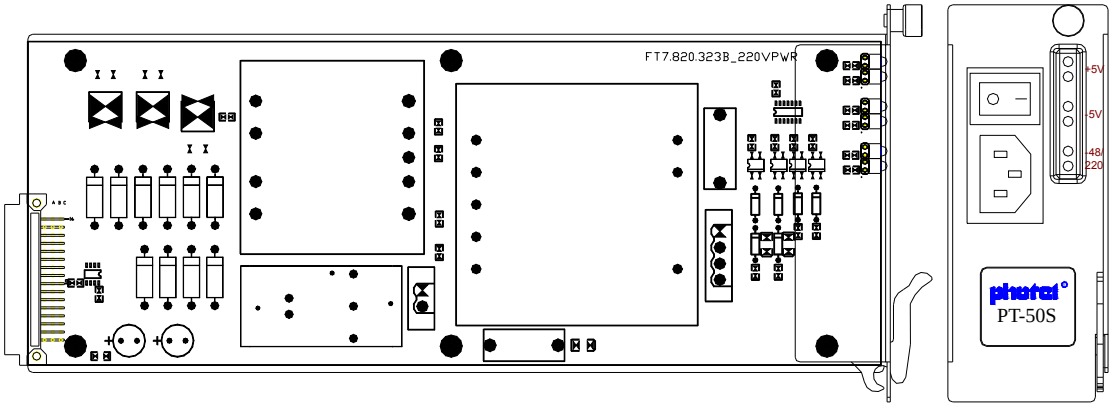


The main functions of the power supply card are voltage conversion and supplying power to the system. The equipment has two power supply card positions for mutual backup (one single power supply card can provide power for the system independently). The input is -48V; the output is +5V and -5V.

There are 6 LED lights (3 LED for red color, 3 LED for green color) on the power supply card for -48V +5V and -5V. When the -48V is normal the LED is green, when there is no -48V power input, the LED will be red. When +5V is normal the LED is green, when +5V is abnormal the LED is red. When -5V is normal the LED is green, when -5V is abnormal the LED is red. The red light means alarm. The NMS terminal can mask the alarm states.

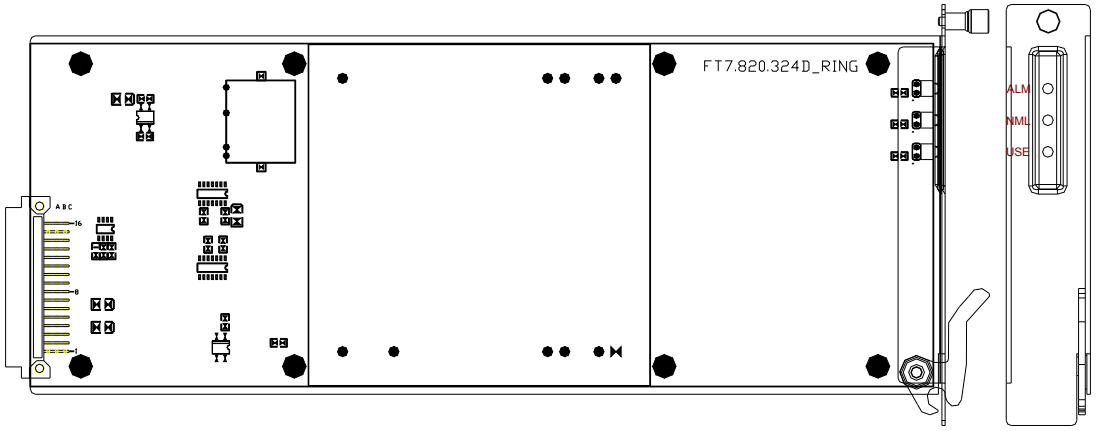
2.4.2.2 AC/DC Power Supply Card

PT-50S



AC/DC power supply card can connect with -48V DC power input from the rear power connector, and it also can connect with 220AC power input from the front panel. AC and DC power can provide power independently, and they also can work at the same time for mutual backup. The functions of this AC/DC power supply are the same as those of -48V power supply card.

2.4.2.3 Ring supply card

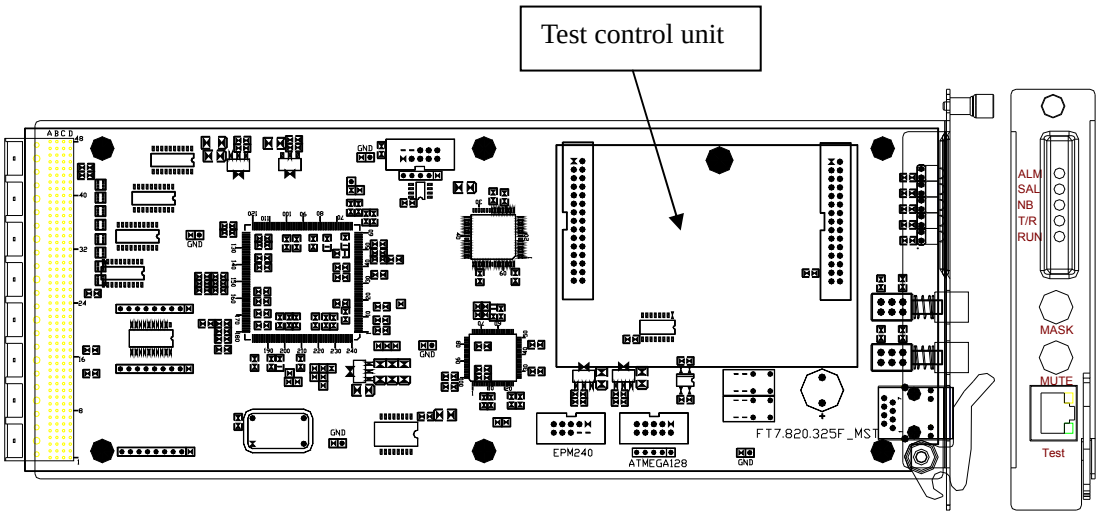


The ring supply card generates ring for FXS, HOT, CRR, MAG cards and testing modules. There are two ring supply card slots for ring supply card; they work in mutual back up. The ring supply card generates ringing signal of 75V, 25HZ and 30W sine wave.

There are three LED in the panel of the ring supply card. The ALM will be red when the card has fault. If the card is in normal state, the NML led will be lit when the system needs the ring supply running. Only one ring supply card works at one time, and the other is in the backup state. USE led will be green when the card supplies ringing signal.

If no ringing signal needed, all LED in the panel of the ring supply card will be off.

2.4.2.4 Master card



FT-50S (6U) PCM Equipment can be equipped with two Master cards (one master card mode can be selected), it will realize the following functions: perform 2048×2048 non-blocking time slot cross connection, perform testing of all analogue and data channels, and perform net management function. The master card mainly consists of one CPU unit, time slot cross connection unit and channel testing unit. The test control unit is used for testing the audio ports and E/M signaling.

Main functions of a Master card:

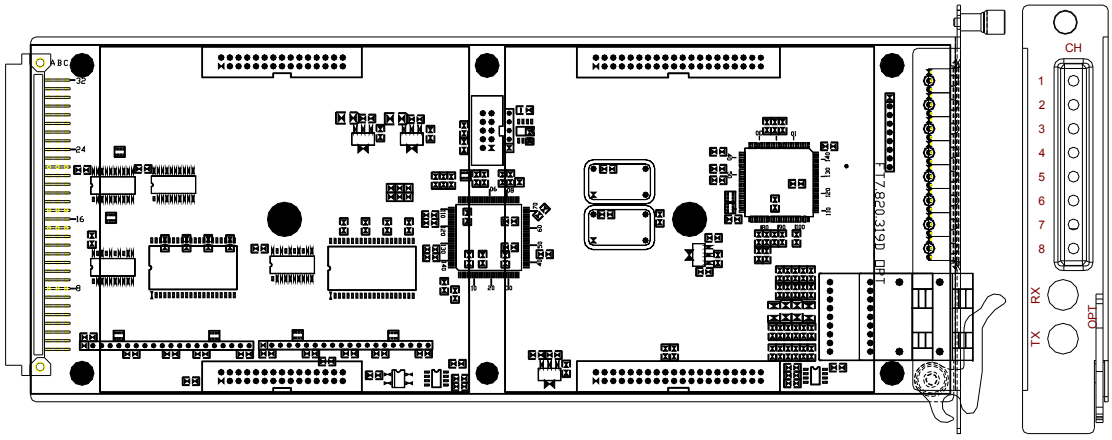
- Indicating various alarm information, and running status.
- Monitoring communication, reporting the system status to NMS console, and receiving control information from the NMS console.
- When it is synchronized with the external clock, the clock is TTL level and is connected via a coaxial cable, and the external clock must be 2.048 MHz.
- There are 5 LED on the panel of the master card. The indicators are defined as follows:

ALM	Red	If any alarm occurred in the FT-50S (6U), the ALM will be red unless the alarm status is masked by NMS.
SAL	Yellow	The SAL will be lit when the FT-50S (6U) is in the downloading state. For example, in progress of power on

		and the data setting by NMS.
NB	Yellow	Lit when the master card is switching to the backup card.
T/R	Green	Lit when communication with NMS.
RUN	Green	RUN led in the running master card will be lit, and the led in the backup card will be off.

- User shuts the alarm bell and the ground signal by pressing the MASK button, but the alarm signals will recover when the new alarm occurs.
- The MUTE key is the key with lock. If the key is pressed down, the alarm bell and the alarm ground signal will never appear.
- There is a TEST socket on the panel of the master card, which can be controlled by the NMS; user can test the analog access channels with PCM meter. The channel number for testing is selected by NMS. The PCM meter is connected to TEST jack for testing (the testing module should be selected to realize this function).
- The communication between the equipment and the NMS console is via the RS232 serial port. The RS232 connector is a RJ45 socket mounted on the backboard. There are two RS232 ports on the backboard. They can be connected in two directions.
- The Master card performs time slot cross connection function, which can accomplish non-blocking cross connection for 64×E1 time slots. The cross connection matrix is 2048×2048.

2.4.2.5 PDH Optical card



The PDH Optical card adopts PDH optical transmission mode, its access

capacity is 8 E1 and 4 10/100M Ethernet interfaces. Herein 4E1 will enter FT-50S (6U) equipment's cross connection matrix, and the other 4E1 will be output directly through rear connectors, which will be used by other access equipment. And the NMS can read the optical alarms of this optical card and the E1 alarms, and the NMS also can mask the warning status.

The PDH optical card has two optical interfaces, which support hot swappable function, the optical module adopt the popular SFP optical module, which can be hot swappable, and it is convenient for maintenance.

The PDH optical card's first sub-channel card is the position (near to the front panel) that EOO ETH sub-channel card can be inserted, and the second sub-channel card position can insert any type of sub-channel cards, such as E1 card, analog card and data card.

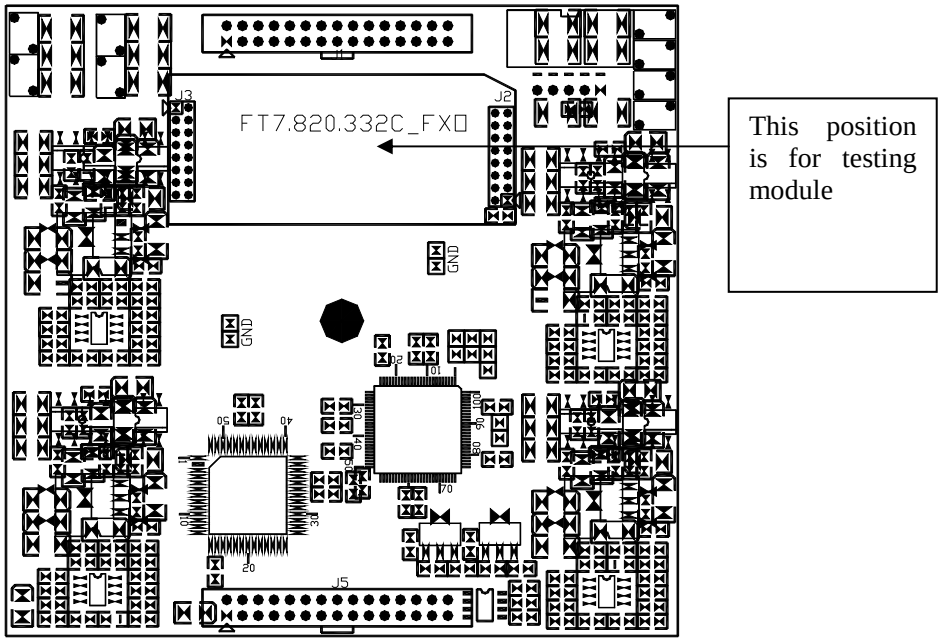
There are 8 two color LED lights, LED 5-8 is corresponding to the second sub-channel card, and the LED status definition is the same as the normal channel card. LED1-4 will indicate the status of optical interface, ETH and E1 interface. Herein 4 green LED is used as LINK indicators for 4 ETH interfaces, LED 1, 2 will indicate the receiving status of the first and second optical interfaces, when the optical synchronization, the corresponding LED is off, when the optical signal loss, the corresponding red LED is on; LED 3 indicates the alarm status of the first and second transparent E1 interface, when these two E1 interfaces has not alarms, the LED will be off, when the both E1 interfaces have alarms, the LED is lit, when the first E1 has alarm, and the second E1 doesn't have alarms, the LED will flash slowly, and the second E1 has alarms, and the first E1 doesn't have alarms, the LED will flash quickly; LED 4 indicates the alarm status of the third and forth transparent E1 interface, when these two E1 interfaces has not alarms, the LED will be off, when the both E1 interfaces have alarms, the LED is lit, when the third E1 has alarm, and the forth E1 doesn't have alarms, the LED will flash slowly, and the forth E1 has alarms, and the third E1 doesn't have alarms, the LED will flash quickly.

2.4.2.6 Access sub-channel card

There are many types of Access sub-channel cards. FXS and FXO are for extension of subscriber line of PBX; 2/4-wire tone is for analogue trunk of PBX, MODEM or other analog line; the hotline interface, magneto phone interface and 2100 carrier wave interface are used for the special line application. 64Kbps data interface for low rate data communication, such as RS232 and V.35 etc; In

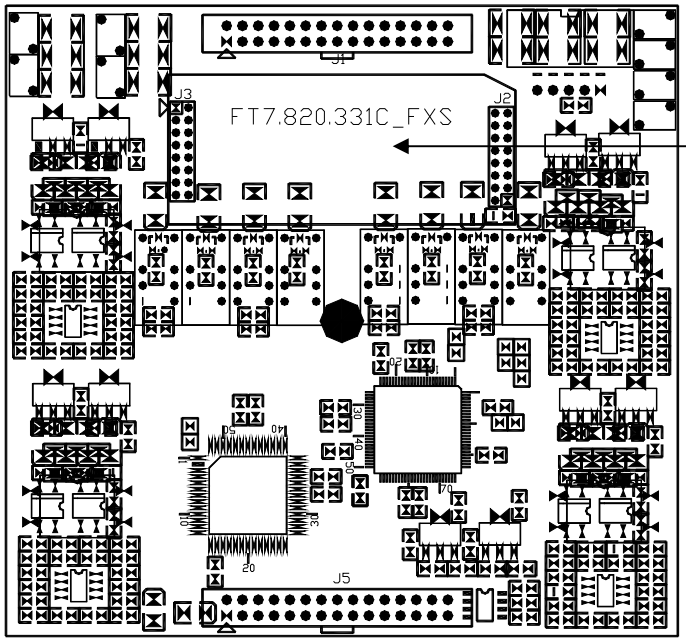
addition, the V.35 interface card and 10/100M Ethernet access card can access N×64Kbps data, the N can be 1 to 31.

2.4.2.6.1 FXO card



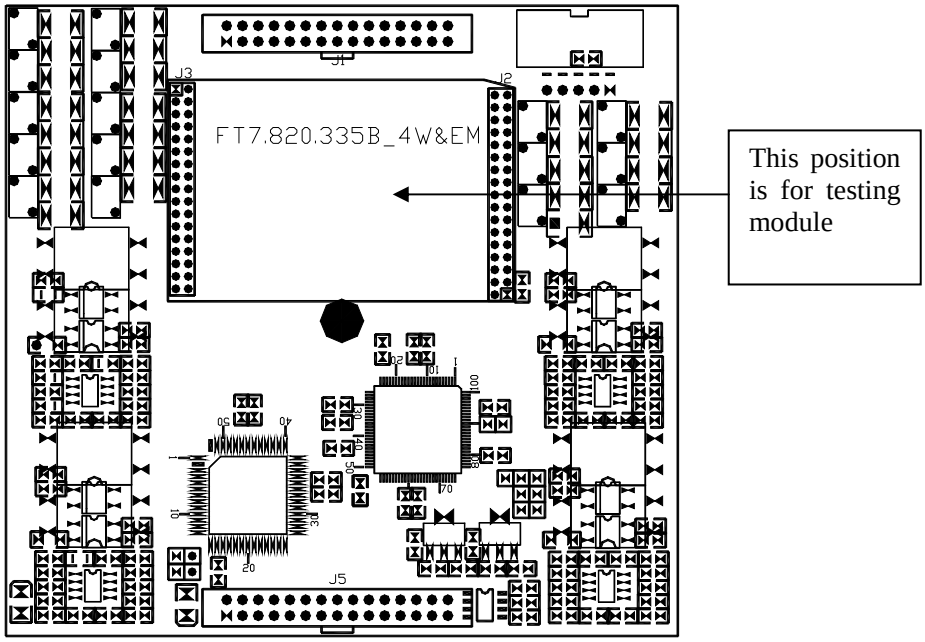
The main function of FXO card is used to connect with the subscriber lines of the switch. It is for extension of subscriber line of PBX. It is used with FXS card usually and for MODEM or analogue trunk of PBX .Its functions include: tone encoding and decoding, 2wire/4wire conversion, ringing signal testing, signaling decoding, etc. Each FXO card contains 4 channels. There is a position for Test module, it can test the audio level and the signaling of every channel and find that if the FXO interface is connected to the PBX firmly. The NMS System controls the testing process. More details please refer to the NMS manual.

2.4.2.6.2 FXS card



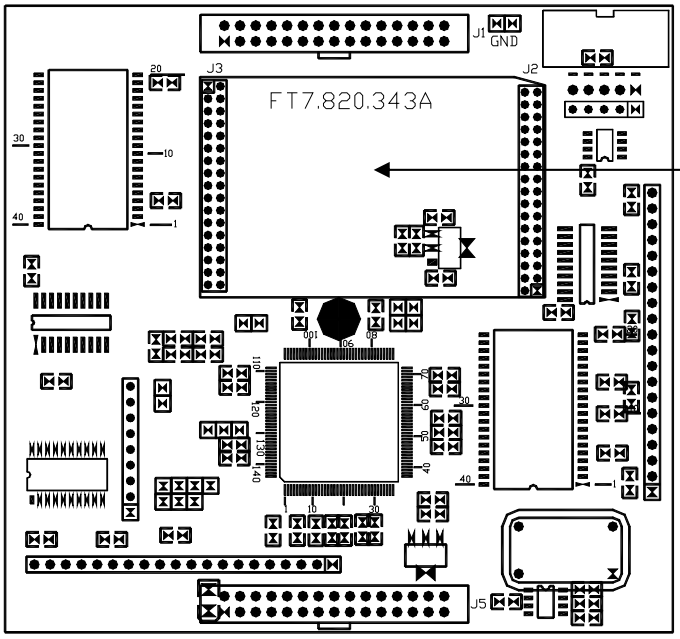
The main function of FXS card is to accomplish the encoding and decoding of audio signal, 2-wire/4-wire conversion, power feed for subscriber, transmitting ringing signal, over-voltage protection for outdoor user lines, etc. Each FXS card contains 4 channels. The FXS card is usually connected with FXO, for example, the local interface is FXO, and then the remote interface must be FXS. There is a position for Test module. The module is used for testing the audio level, the signaling of every channel and outdoor twisted cable. User can test the outdoor twisted cable whether the cable is shorted, opened and grounded. The NMS System controls the testing process. More details please refer to the NMS manual.

2.4.2.6.3 4-wire E&M audio card



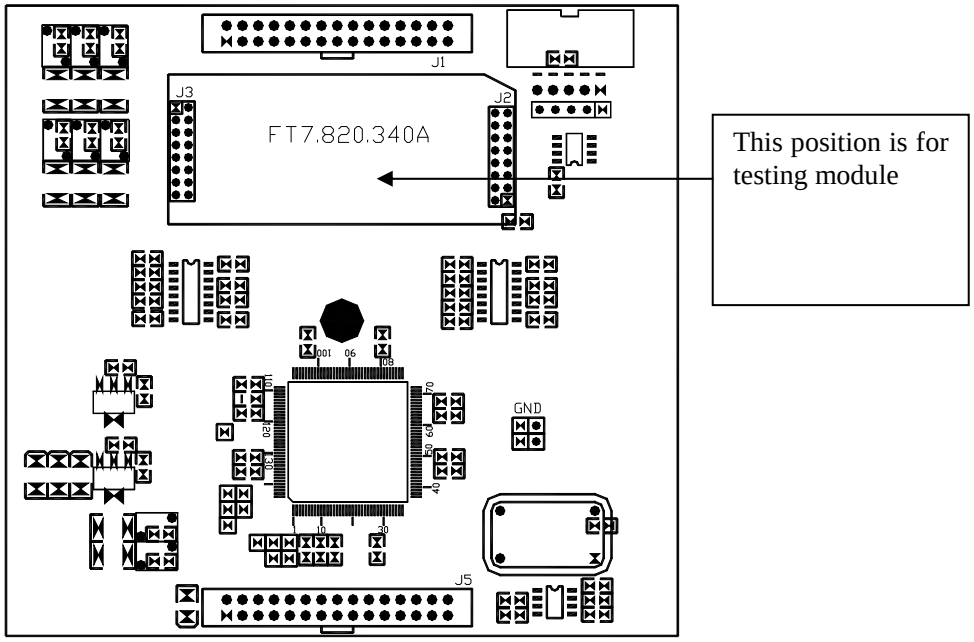
The main functions of the 4-wire E&M audio card include voice encoding and decoding, and providing independent audio transmitting/receiving channel, accessing E and M signal. Each card contains 4 channels. This interface is usually used for connection with a tone Modem. The NMS can adjust the attenuation of the channel. There is a position for Test module that for testing the audio level of transmitting, the audio level of receiving and the E/M signal of each channel. The NMS System controls the testing process. More details please refers to the NMS manual.

2.4.2.6.4 Co-directional data card



Each Co-directional data card contains 4 channels. They conform to ITU-T G.703 standard. The test modules are used for testing whether the data channels are working correctly. The NMS System controls the testing process.

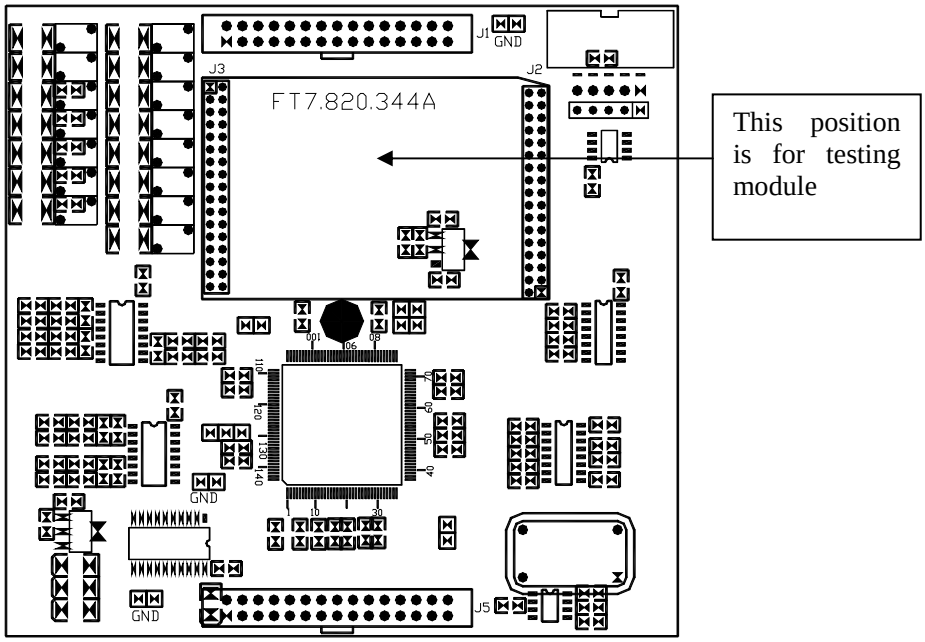
2.4.2.6.5 RS232 card



Each RS232 data card contains 4 channel asynchronous RS232 data interfaces. They conform to ITU-T V.24/V.28 standard. The test module is for

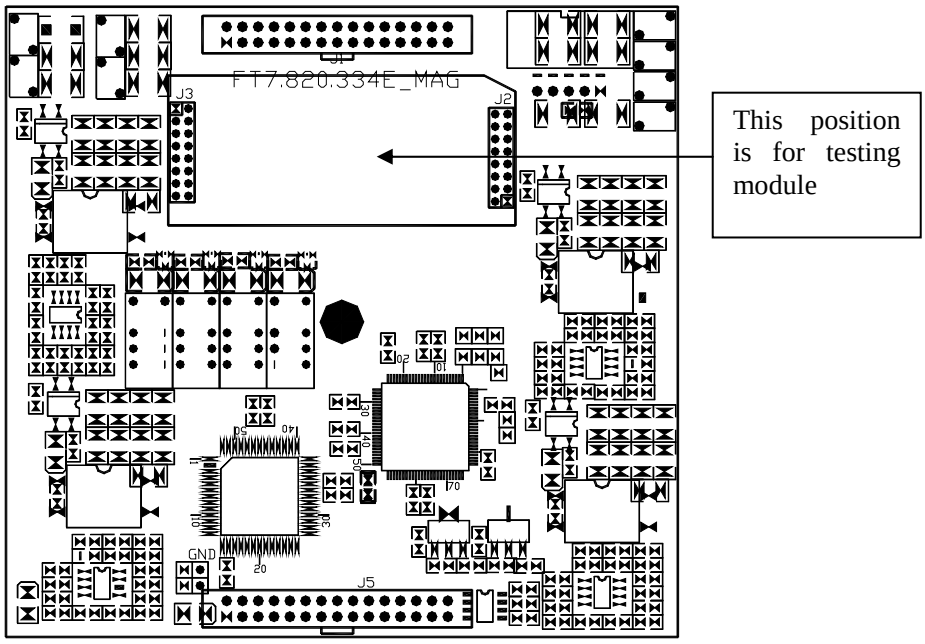
testing whether the data channels are working correctly. The NMS System controls the testing process.

2.4.2.6.6 N×64Kbps FV.35 card



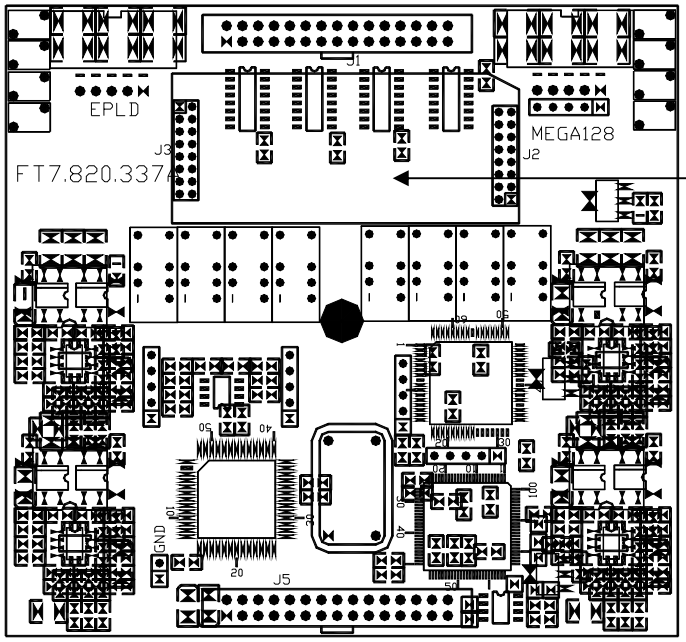
Each N×64Kbps data card contains 1 channel synchronous N×64Kbps V.35 data interface, N is from 1 to 31. There is a position for test module. The test module is for testing whether the data channel is working correctly. The NMS System controls the testing process.

2.4.2.6.7 Magneto interface card



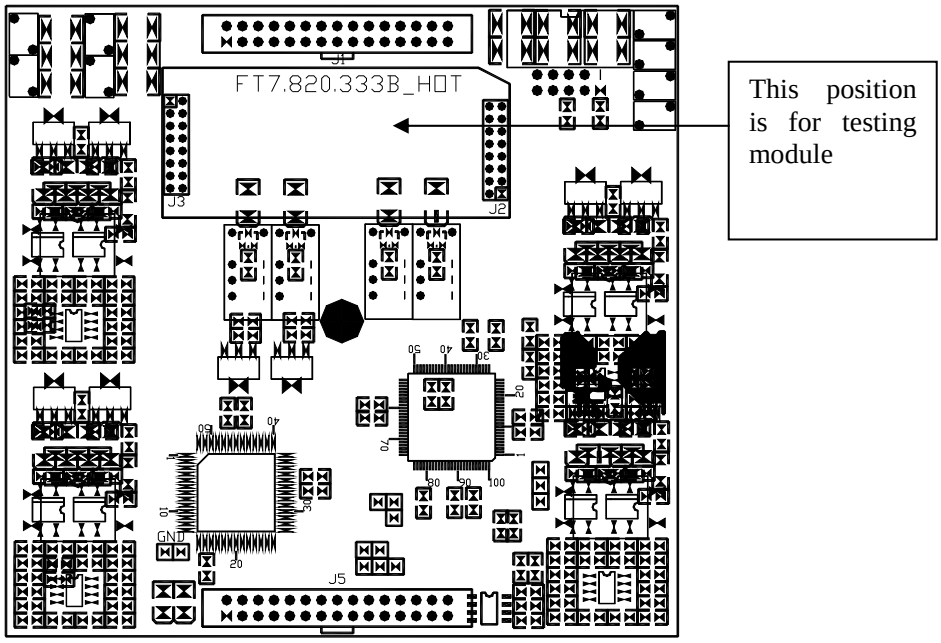
The Magneto interface card provides magneto interfaces to connect with a magneto set or magneto attendant console. The signaling transmission of this card adopts the digital signaling mode; it is the same as that of PCM. The audio channel parameters and output are the same as ordinary audio ports. The main functions are tone encoding and decoding for telephone, testing of calling signal, and ringing for subscriber, etc. Each card contains 4 channels. There is position for Test module that is used for testing the audio level, the signaling of every channel and the outdoor twisted cable. User can test the outdoor twisted cable whether the cable is shorted, opened and grounded. The NMS System controls the testing process. More details please refer to the NMS manual.

2.4.2.6.8 Carrier wave magneto interface card



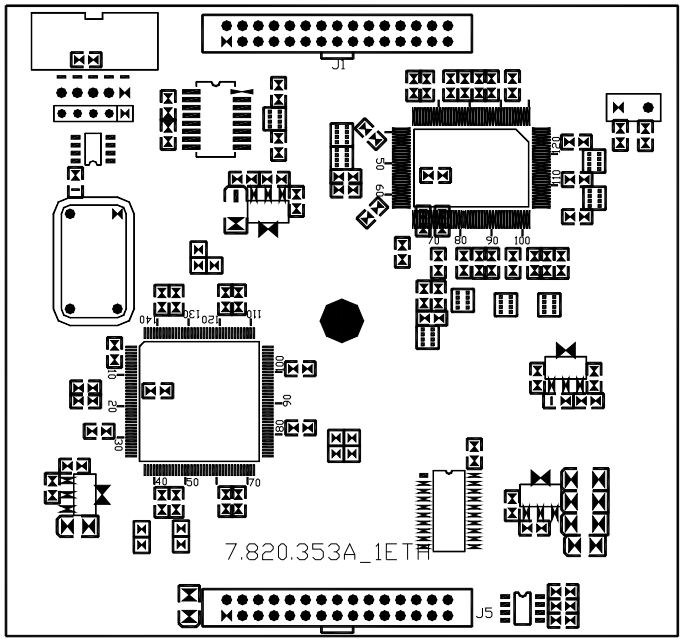
The carrier wave magneto interface card provides a magneto interface for connection with a magneto set or magneto attendant console. Different from the ordinary magneto interface card, the signaling transmitted on this card is 2100Hz signal. This card has the conversion function between 25Hz ringing signal and 2100Hz audio signal. There is a position for Test module that is used for testing the audio level, the signaling of every channel and the testing outdoor twisted cable. User can test the outdoor pair cable if the cable is shorted, opened and grounded. The NMS System controls the testing process. More details please refers to the NMS manual.

2.4.2.6.9 Hotline telephone card



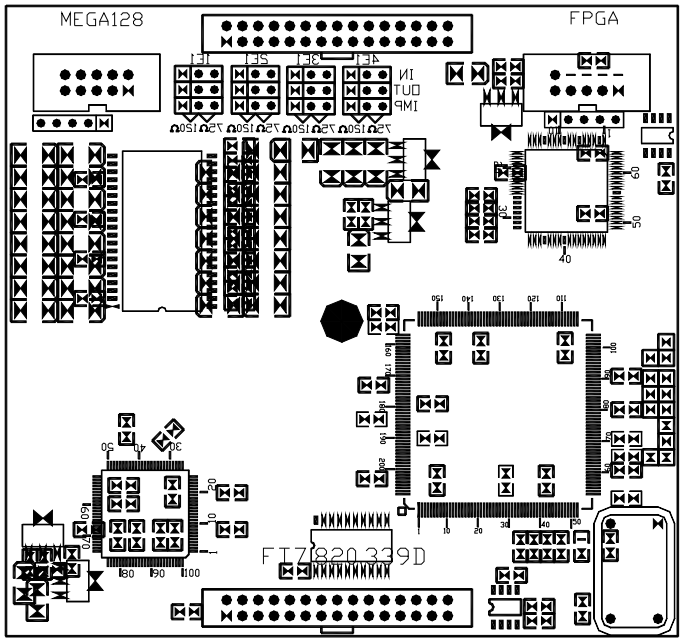
The main functions of the hotline telephone card are hotline telephone tone encoding and decoding, hook-off and hook-on testing, feeding power to telephone set and ringing. Each card contains 4 hotlines. There is a position for Test module that is used for testing the audio level, the signaling of every channel and the outdoor twisted cable. User can test the outdoor twisted cable if the cable is shorted, opened and grounded. The NMS System controls the testing process. More details please refer to the NMS manual.

2.4.2.6.10 10/100M Ethernet data interface card



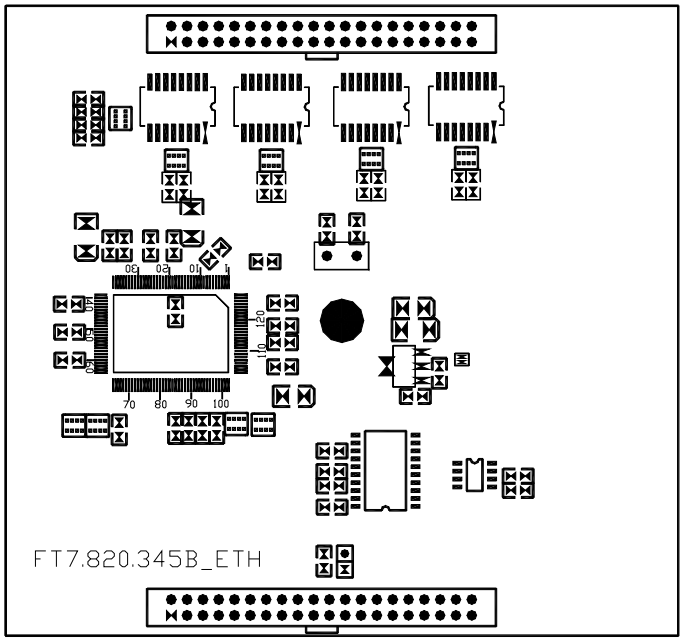
In FT-50S (6U) PCM Multiplexer, the 10/100BASE-T interface is usually for interconnection of Ethernet. The real speed of the port will be N×64Kbps, the value N is from 1 to 31 and will be set by NMS.

2.4.2.6.11 4E1 card



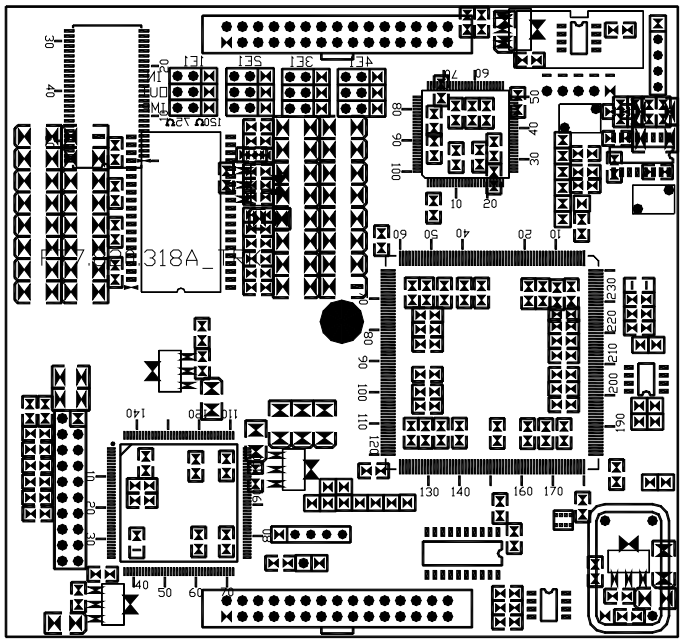
4E1 card has four E1 framers. The output/input impedance can be 75 ohm or 120ohm, it is self-adjustment. This 4E1 card will execute 4E1 connection with the master card, and the NMS can read alarms information and impedance setting information of this 4E1 card, and the NMS can control the E1 running mode (the NMS can set it as PCM30 or PCM31 mode), and can set self-loop for E1 interface.

2.4.2.6.12 EOO card



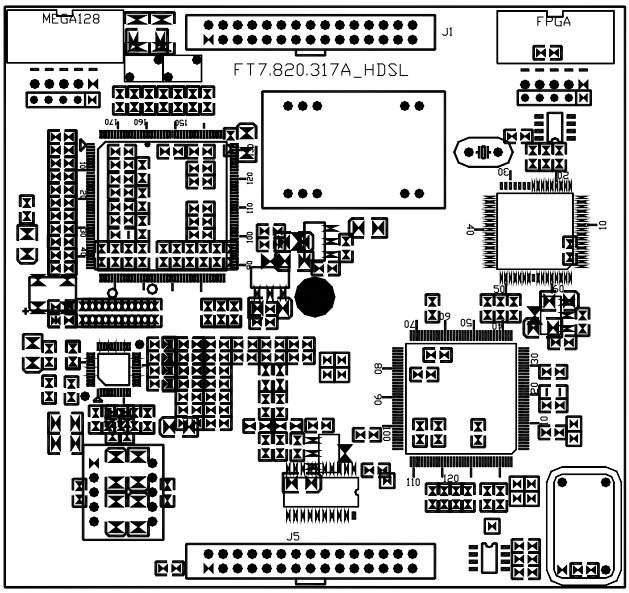
EOO(Ethernet Over Optical) card will accomplish the connection between 4 channel Ethernet and optical link. Its total speed is 100M, and these 4 Ethernet interfaces can set VLAN or not by jumpers.

2.4.2.6.13 Relay card



One Relay card can access 4E1, and each E1 can adopt different protocols including: China No.1 signaling, PRI signaling, SS7 signaling or V5 signaling protocol. Theoretically one FT-50S (6U) can insert up to 16pcs relay card, and can be connected with 64 switches (these switches can be different protocols) separately. When the FT-50S (6U) equipment is equipped with the relay card, the cross connection matrix can assign certain FXS interfaces to the designated relay card in master card, which will become a PABX switch with relay interface, then it can realize free dialing among FXS interfaces, FXS interfaces and remote switches, and it also support three party call, and realize basic functions of PABX switch.

2.4.2.6.14 HDSL Card



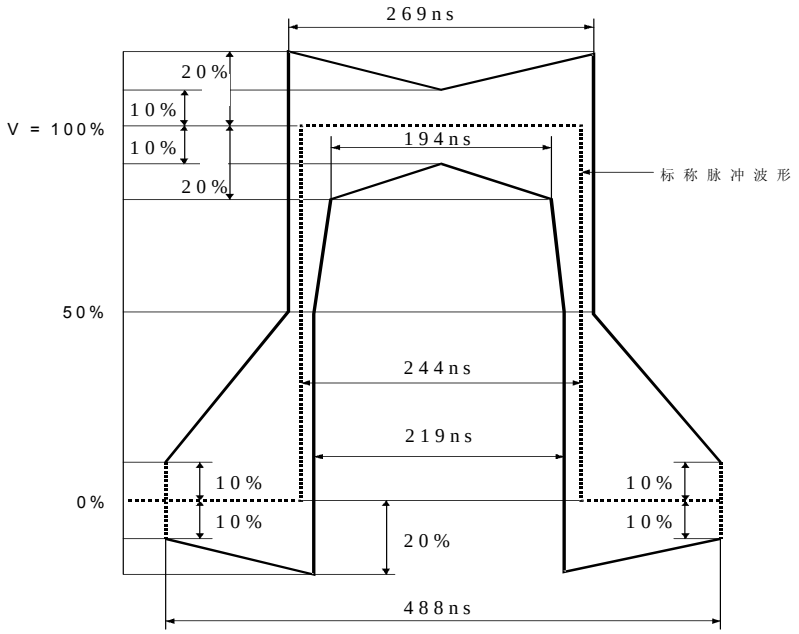
The HDSL card can be inserted into the slots that E1 can be inserted. HDSL interface is 2-wire mode, and the multiplexing mode is TC-PAM, the maximum transmission distance is 3.5km through 0.4mm diameter civil telephone cable. Each HDSL interface card can transfer one E1 interface. The E1 interface of HDSL card will enter cross connection matrix of the equipment, this cross connection matrix will distribute the time slot channel. The clock mode of the HDSL card will be set by the NMS.

3 Technical Specification

3.1 Electrical Characteristics of 2M Interface

- Bit rate: 2048Kbps±50ppm
- Code type: HDB3 code, conforming to G.703 standard
- Input impedance: 75Ω (unbalanced interface), 120Ω (balanced interface) optional
- Frame structure: Conforming to G.704, G.706

- Compression law: Conforming to G.711
- Level: ±2.37V±10%
- The pulse waveform conforms to a sample as shown below.



Nominal pulse waveform

Waveform sample of 2M-line code

3.2 FXS and FXO Interface and Signaling

3.2.1FXO

Hook-off impedance: < 500Ω

Hook-on impedance: > 10KΩ

3.2.2FXS

Loop impedance: 2000Ω (including telephone set)

Idle user line voltage: 50V

Loop current: 25mA

Hook-off threshold: 8mA

3.3 Ringing

3.3.1Remote ringing current

Frequency: 25Hz ± 3Hz

Magnitude: 75V ± 5Vrms

Time delay of ringing current: < 50 ms

3.3.2Ringing testing

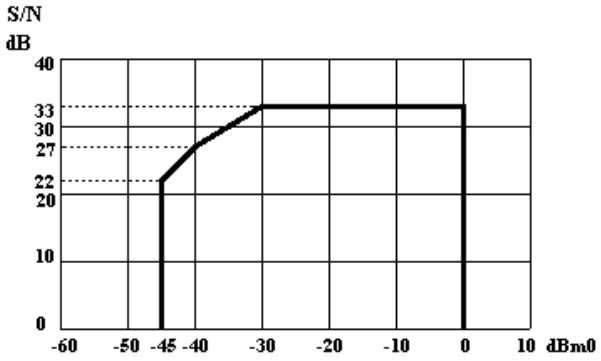
Magnitude range: > 38Vrms

3.4 Audio Interfaces

3.4.1 2-wire tone

Impedance:	600
Audio frequency range:	300-3400 Hz
Encoding law:	G.711 A law in CCITT Recommendation
2-wire Interface level:	2-wire sending: 0dBr ± 0.5dBr 2-wire receiving: -3.5dBr ± 0.5dBr
Return loss:	300-600Hz >12dB 600-3400Hz >15dB
Frequency response:	300-3400Hz deviation conforming to requirement in 5.5 of GB/T 6879-1995
Idle noise:	≤ -65dBm0p
Gain:	Conforming to requirement in 5.11 of GB/T 6879-1995

Total S/N ratio: Conforms to ITU G.713 sample.



Input level

2-wire interface total S/N ratio sample

3.4.2 4-wire tone

Attenuator of 4-wire tone cards can be changed by NMS System

4-wire Interface level:

4-wire transmitting:-10dBr±0.5dBr (the change range is 16 dB)

4-wire receiving: -10dBr ±0.5dBr (the change range is 16 dB)

Impedance	600
Audio frequency range	300-3400 Hz
Encoding law	G.711 A law in CCITT Recommendation
-wire Interface level:	4-wire transmitting: -14dBr 4-wire receiving: +4dBr
Return loss:	300-3400Hz >20dB
Frequency response:	300-3400Hz deviation conforming to requirement in 5.5 of GB/T 6879-1995
Idle noise:	≤ -65dBm0

Gain:	Conforming to requirement in 5.11 of GB/T 6879-1995
Total S/N ratio:	Conforms to ITU G.713 sample.

3.4.3Magneto interface

3.4.3.1 Ordinary magneto interface

Voice parameters are the same as that of ordinary 2-wire tone (see 3.4.1.1)

Ringing signal test: min. 20Vrms, testing time 0.5s.

Signaling mode: digital mode (PCM 16-time slot A code)

3.4.3.2 Carrier wave magneto audio interface

1. Audio

2-wire Interface level:

2-wire sending: 0dBr ±0.5dBr

2-wire receiving: -3.5dBr± 0.5dBr

Other parameters are the same as ordinary 2-wire tone (see 3.4.1.1)

2. Signaling:

a. Ringing signal test: min. 20Vrms.

b. Signaling mode: analogue mode —— 2100Hz audio signal.

c. 2100Hz signal generator

Magnitude: -6dBm ±1dBm

Frequency: 2100Hz ± 5Hz

d. Signaling testing

Magnitude range: not less than -17dBm

Frequency range: 2100Hz ± 50Hz

3.4.4Hotline telephone

Loop impedance: 2000Ω (including telephone set)

Idle circuit voltage: -48V

Loop current: 25mA

Hook-off threshold: 8mA

3.4.5Synchronous data interface

3.4.5.1 G.703 interface

Interface code type: conforming to CCITT G.703 synchronous data interface standard

Interface rate: 64Kbps synchronous data

3.4.5.2 Data interface

Interface level: conforming to CCITT V.35, V.24, V.28 or V.11 standard

Interface rate: 64Kbps

3.4.5.3 N*64K V.35 interface

Interface level: conforming to CCITT V.35 standard or V.11 standard (optional)

Interface rate: N*64Kbps (N=1 ~ 31)

3.4.6Asynchronous data interface

Interface level:conforming to RS-232/ V.24 standard or RS-422V.11 standard (optional)

Interface rate: less than or equal to 14.4Kbps asynchronous data

3.4.7 10/100M Ethernet Data interface

- 10/100Base-T interface speed self-adaptive.
- Able to memorize 10,000 MAC address and LAN address list.
- Buffering capacity: 256 frames, and 1 frame transfer delay.

3.4.8 PDH Optical card

The PDH optical card can provide 4 channel 100M Ethernet interfaces and 8E1 interfaces, herein 4 E1 interfaces will be output directly, which will be used by other access equipment, and the other 4E1 will enter cross connection matrix of the equipment.

E1 interface characteristics:

Bit-rate: 2048Kbps±50ppm

Code type: HDB3 code, conforming to G.703 standard

Input impedance: 75Ω (unbalanced interface),

Optical interface characteristics:

Light wavelength: 1310nm or1550nm

Light source: Single mode FC/SC socket

Average optical output power:

-10dBm or -14dBm (typical)

0dBm and -6dBm (optional)

Receiving sensitivity: -34dBm

Maximum permissible input optical power: -14dBm

Ethernet interface characteristics:

10/100Base-T interface self-adaptive

Has VLAN function

3.5 Monitoring Interface

Two RS232 interfaces, adopting RJ45 socket, 9600 bps, 8 data bits, 1 stop bit.

3.6 Power Supply

Input voltage: Standard value -48Vdc

Voltage range: -36Vdc to -72Vdc

Power consumption: <100W (when no hook off or ringing)

3.7 Operation Environment

Temperature: 0-45℃

Humidity: ≤85% (30℃)

Air pressure: (70~106) Kpa

3.8 The principle of test function

FT-50S (6U) may test most interface cards. For instance,

The procedure of FXS card test is below:

a. Select the channel number of FXS interface in the NMS.

b. Connect the FXO circuit in the test unit with the FXS interface by setting the MPU of the MST card.

c. Control FXO, and make the FXS into hook-off state. Then the MPU will read the state that the FXS is in hook off state, which means that the transmitting signal is correct.

d. MPU controls the output ringing signal of FXS. If the FXO circuit in the test unit will receive the ringing signal, which means that the receiving signal is correct.

e. MPU writes a series of data to the receiving port of the FXS. The data includes amplitude and frequency. And MPU reads another series of data from sending port of the FXO. MPU sends the received data to the NMS platform. The NMS platform calculates and gets the result and tells

whether the receiving port of the FXS is correct.

f. MPU writes a series of data to the receiving port of the FXO in the test unit. This data includes amplitude and frequency. And read another series of data from sending part of the FXS. MPU sends the receiving data to the NMS platform. The NMS platform calculates and gets the result and tells whether the sending port of the FXS is correct or not.

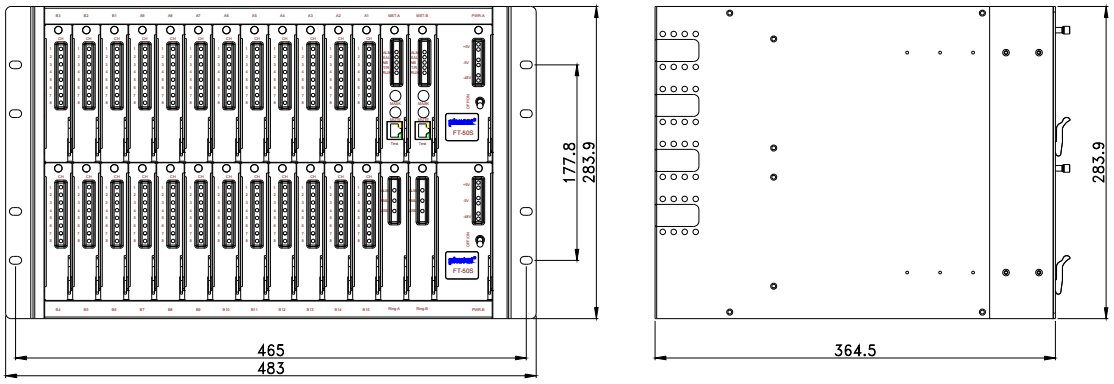
The procedures of RS232 card test are as follows:

a. Make the TX line and RX line of the RS232 shorted by setting MPU of the MST card.

b. Writes a series data to the receiving port of the RS232.

c. The MPU will get the same data from the sending port of the RS232. If so, the RS232 interface is correct.

4 Sub-Rack Dimensions



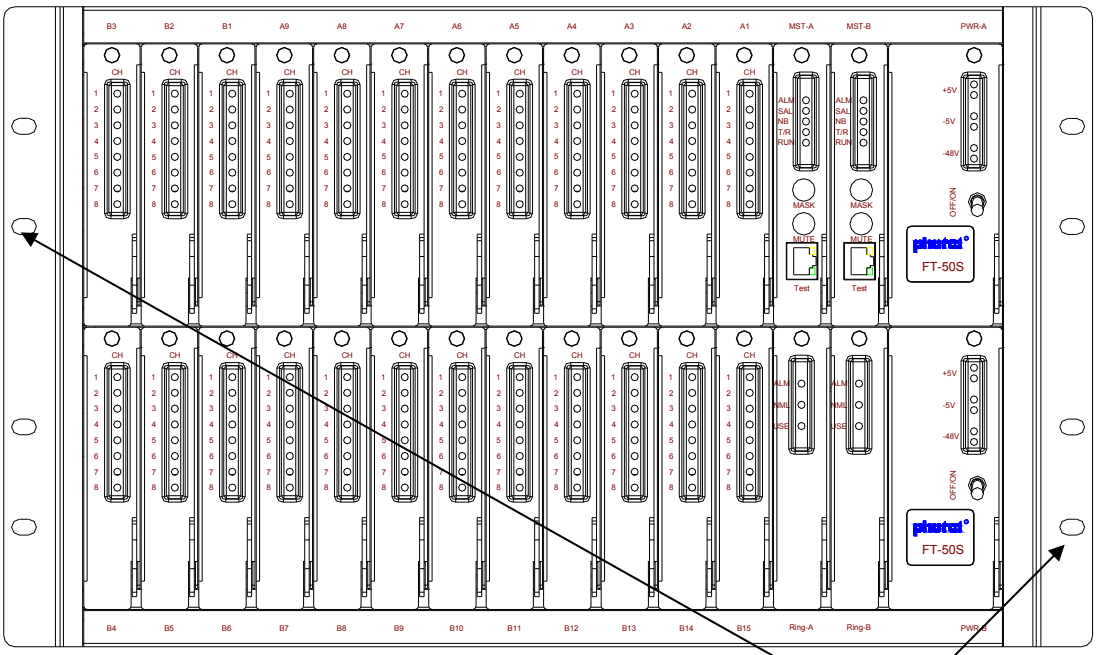
Weight: 15kg

5 Installation

5.1 Install the rack

5.1.1 Install the rack to the 19inch shelf

Use eight 6×10 screws to fix the rack into the standard 19 inch shelf. Please do not cover the top and the bottom of the rack for heat dissipation.

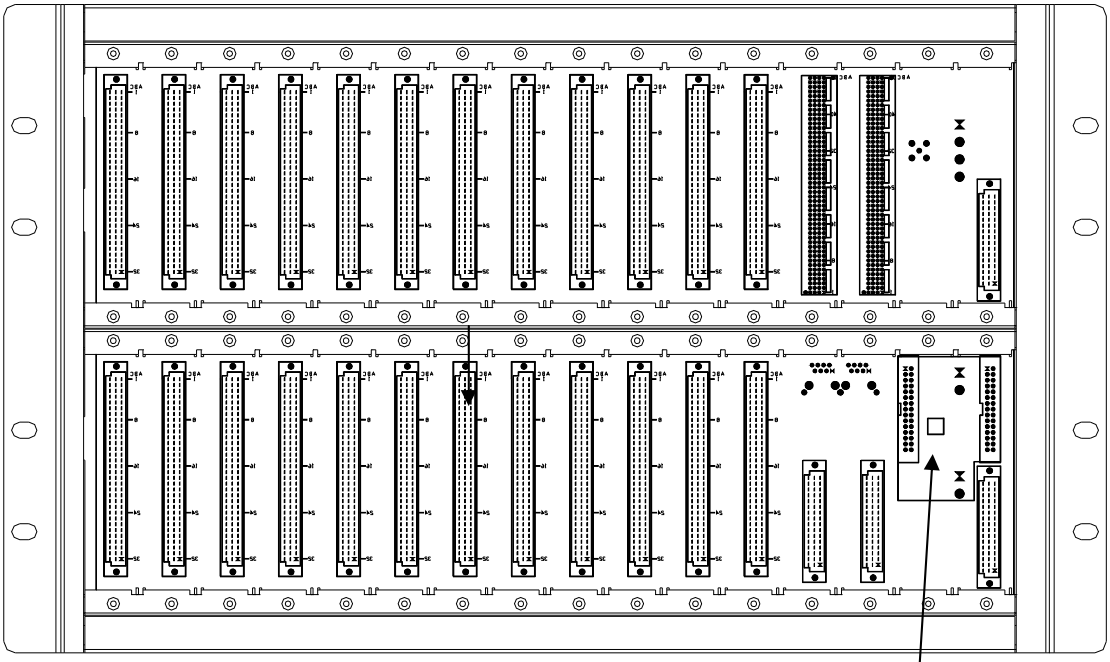


Front view

Eight install positions

5.1.2Functional card configuration

First of all, the ID card should be installed in the rack.

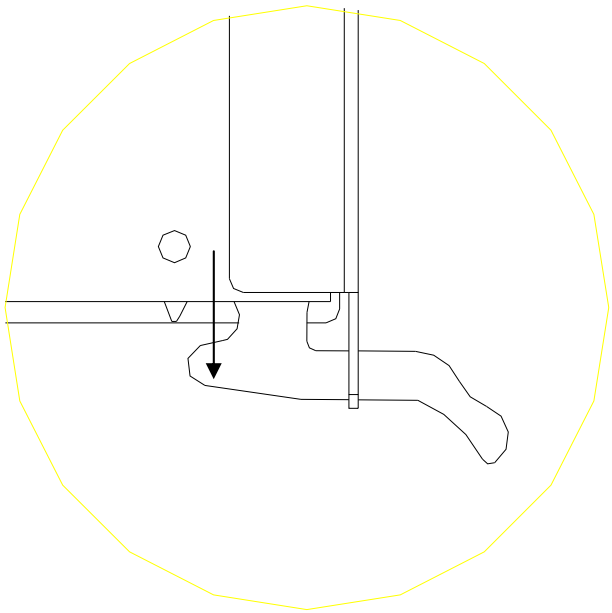


Position for ID card

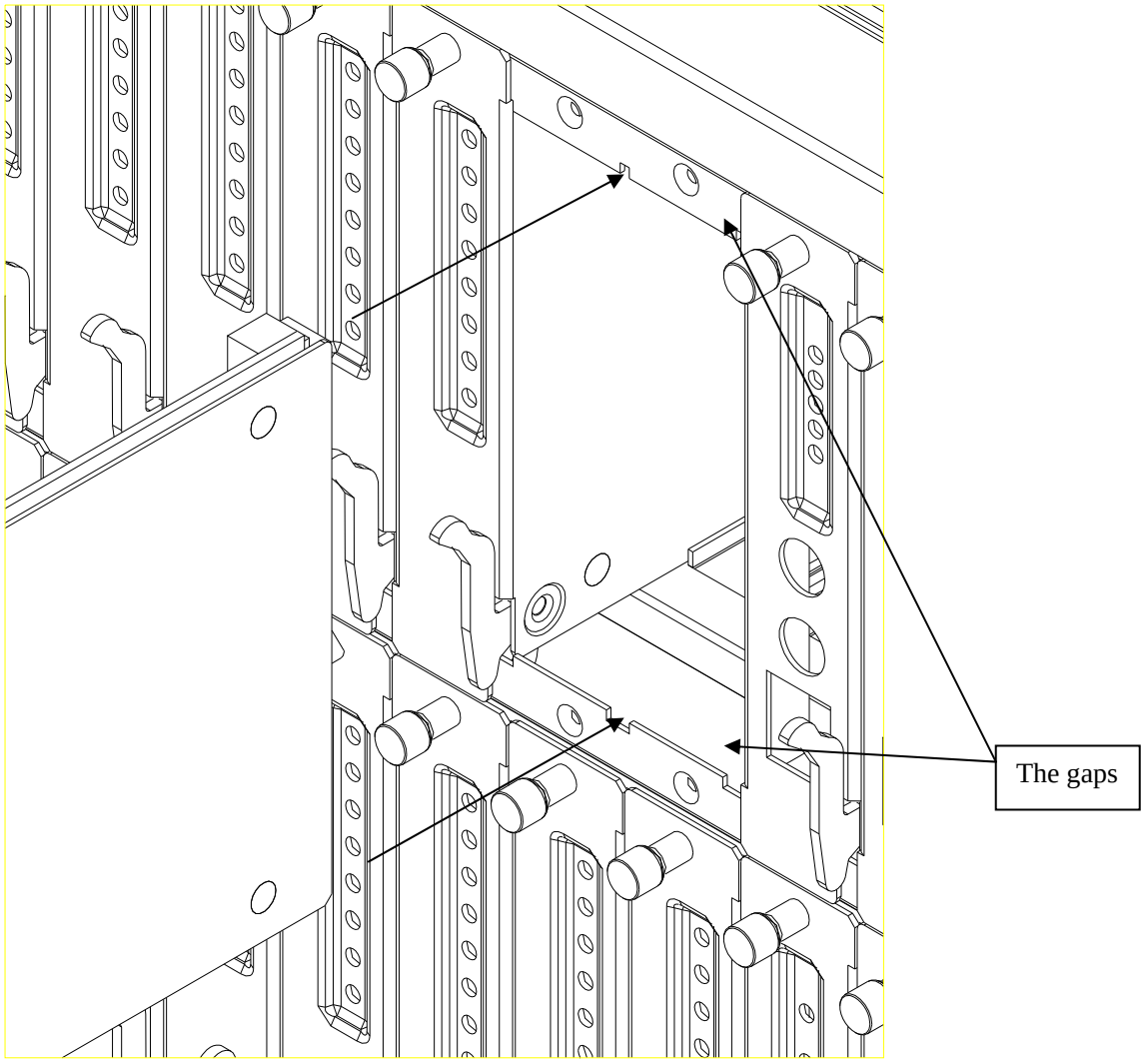
Plug in the cards that you want to use. You should plug the functional cards into the corresponding positions. The 4E1 card, N×64K card and ETH card can be only plugged in slot A1 to A8 positions.

5.1.3Plug the cards

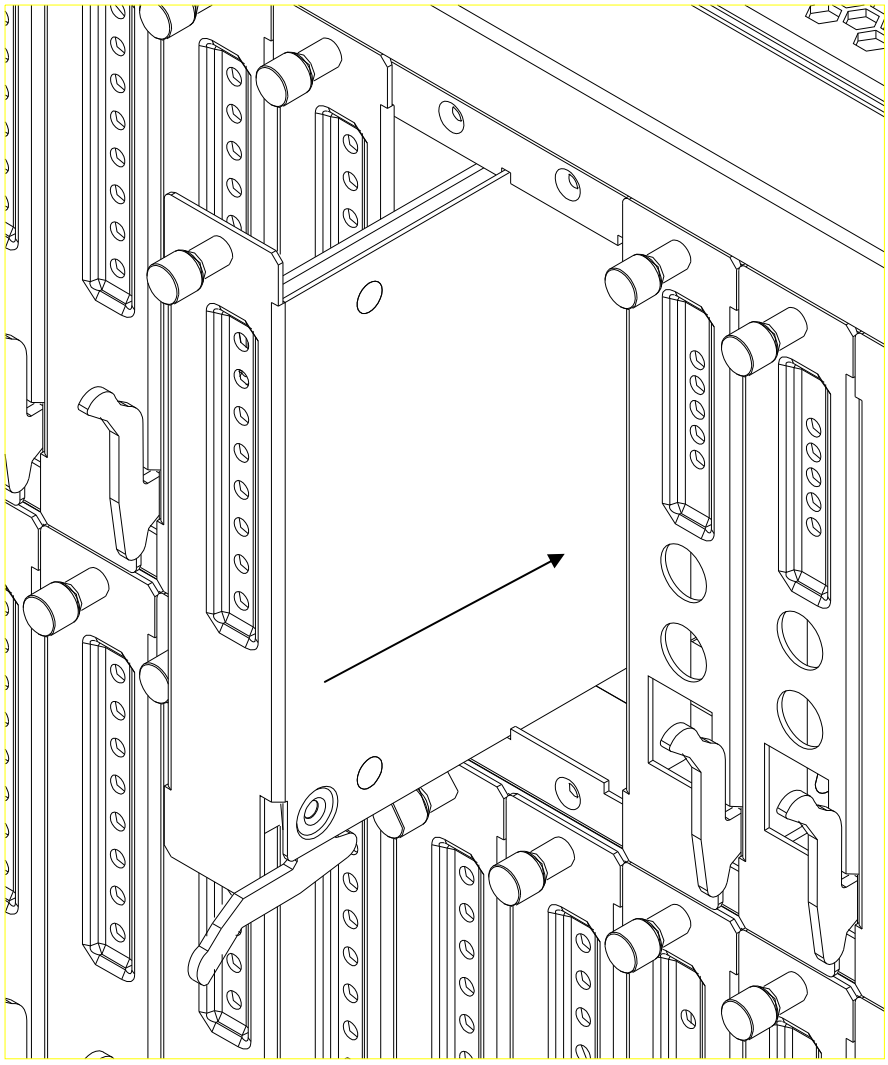
Firstly, you should make the handle of the card in horizontal direction.



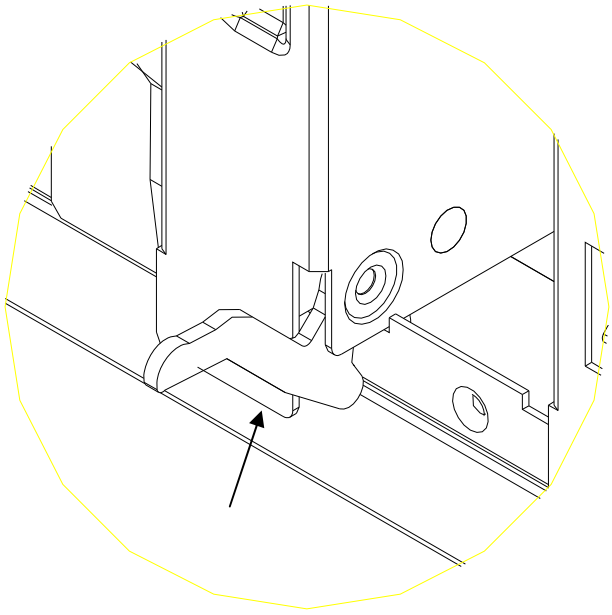
Plug the card into the corresponding position. The card should be plugged in along the gap of the rack. Because the slot gap in the underside is a little wider, so the card should follow the right side.

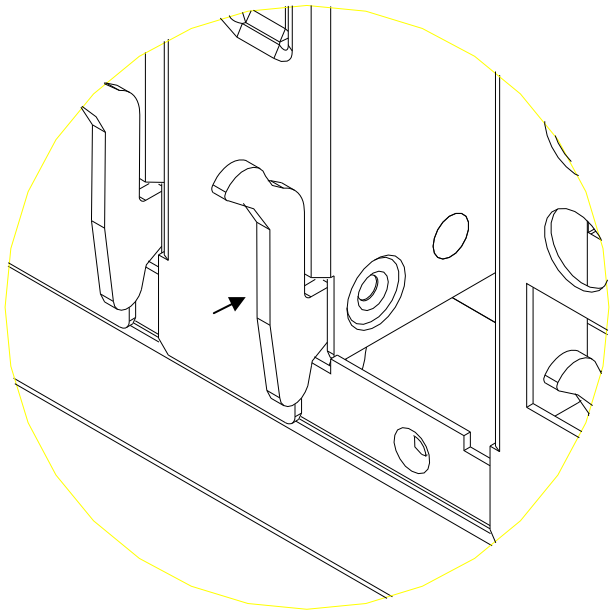


You must make the card upright position and slide in carefully.



When the handle reaches the rack, you can screw the handle till the card is in the rack totally.



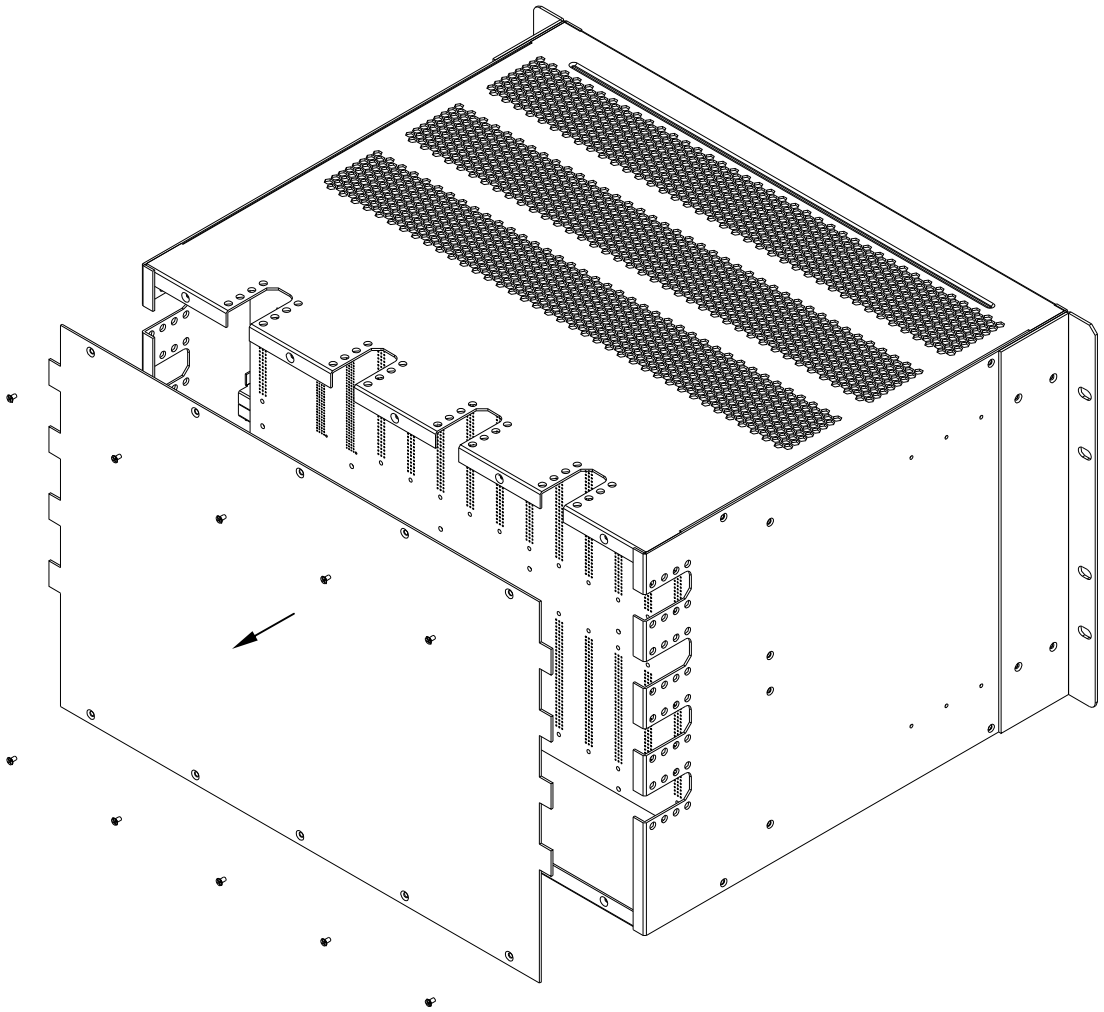


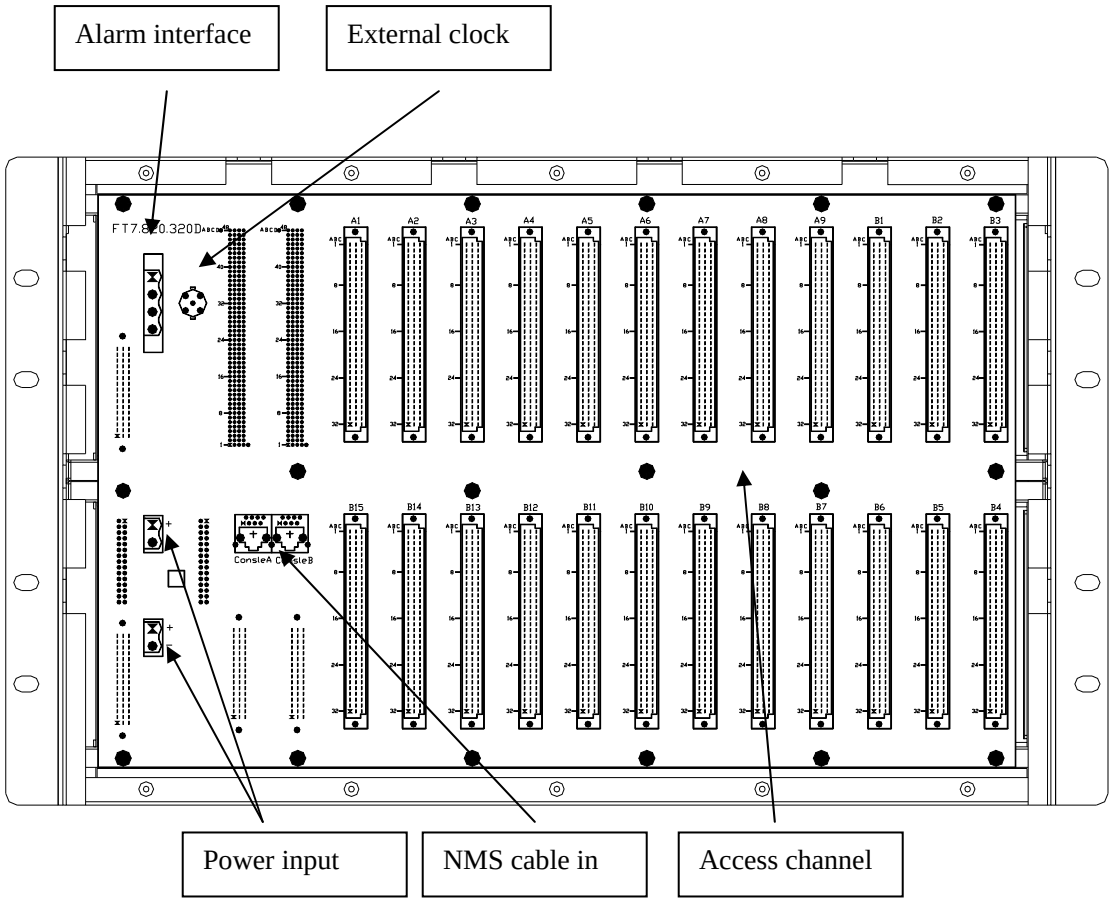
5.1.4Cable configuration

5.1.4.1 Take off the back cover.

For configuring the cables, the back cover should be taken off

firstly. When all cables have been connected, the back cover should be mounted again to avoid damage of the equipment.



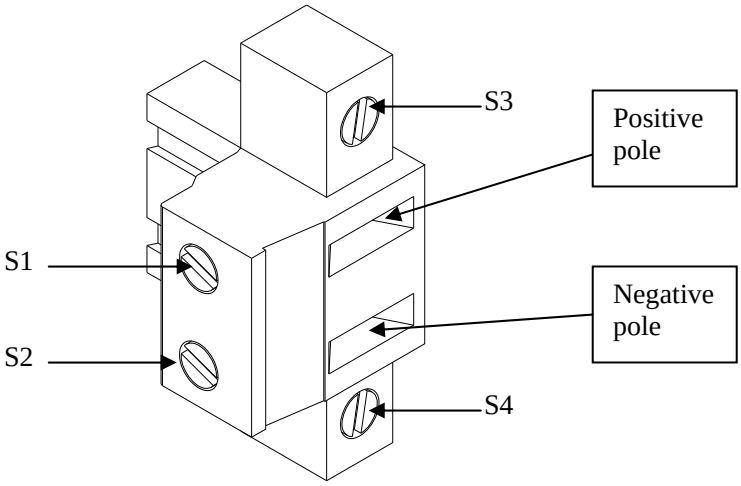


5.1.4.2 The power interface

FT-50S (6U) has two power input interfaces. Each interface has two pins, one is positive pin and the other is negative pin. The power voltage is 48V. At least one input interface must be needed. Two input interfaces will mutually backup. Two positive pins are linked together inside the FT-50S (6U).

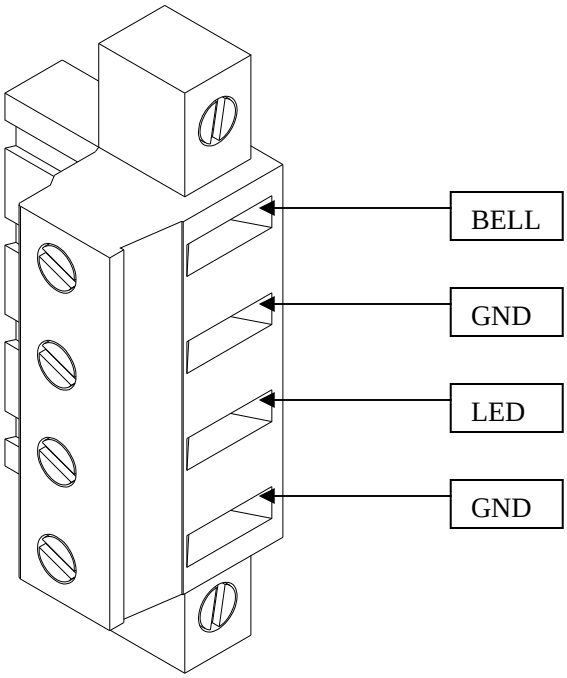
To configure the power interface, you should use the power cable of one square millimeter, and peel off the skin about 5mm, and fix the cable to the connector tightly with two screws.

The screw S1 and S2 are used to tighten the power cable and S3 and S4 are used to tighten the connector to FT-50S (6U).



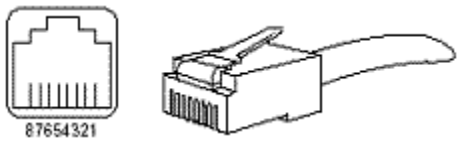
5.1.4.3 The alarm interface

There is one alarm output interface for central monitoring. When the FT-50S (6U) alarms, it will produce the ground signal at BELL and LED, which will be used to ring the bell and light the alarm light.



5.1.4.4 The NMS system interface

There are two RS232 ports for NMS. These two ports are independent, and can be used to connect other equipment or the NMS terminal.



Pin	1	2	3	4	5	6	7	8
Define		T	R		GND		PWR	PWR

T is RS232 signal from the FT-50S (6U).

R is RS232 signal to FT-50S (6U).

GND is the ground signal.

PWR will provide +5V power supply for FT-50S (6U). This power is used for NMS Ethernet adaptor.

5.1.4.5 Access channel interface

There are 24 access card positions for channel interfaces. The name of the card position is A1 to A8 and B0 to B15. The pin assignment for these is as below:

Access interface pin assignment (table 1):

V．35	G703	RS232	4W	2W	A	C	2W	4W	RS232	G703	V．35
RXD1+	INA1	TXD1	4WTT1	2WT1	1	1	2WR1	4WTR1	TXD2	OUTA1	RXD2+
RXD1-	INB1		4WTT2	2WT2	2	2	2WR2	4WTR2		OUTB1	RXD2-
TC1+	INA2	GND	4WTT3	2WT3	3	3	2WR3	4WTR3	GND	OUTA2	TC2+
TC1-	INB2		4WTT4	2WT4	4	4	2WR4	4WTR4		OUTB2	TC2-
TXD1+	INA3	RXD1	4WRT1		5	5		4WRR1	RXD2	OUTA3	TXD2+
TXD1-	INB3	GND	4WRT2		6	6		4WRR2	GND	OUTB3	TXD2-
RC1+	INA4		4WRT3		7	7		4WRR3		OUTA4	RC2+
RC1-	INB4		4WRT4		8	8		4WRR4		OUTB4	RC2-
RXD3+		TXD3	E1		9	9		M1	TXD4		RXD3+
RXD3-			E2		10	10		M2			RXD3-
TC3+		GND	E3		11	11		M3	GND		TC3+
TC3-			E4		12	12		M4			TC3-
TXD3+		RXD3			13	13			RXD4		TXD3+
TXD3-		GND			14	14			GND		TXD3-
RC3+					15	15					RC3+
RC3-					16	16					RC3-
RXD5+	INA5	TXD5	4WTT5	2WT5	17	17	2WR5	4WTR5	TXD6	OUTA5	RXD6+
RXD5-	INB5		4WTT6	2WT6	18	18	2WR6	4WTR6		OUTB5	RXD6-
TC5+	INA6	GND	4WTT7	2WT7	19	19	2WR7	4WTR7	GND	OUTA6	TC6+
TC5-	INB6		4WTT8	2WT8	20	20	2WR8	4WTR8		OUTB6	TC6-
TXD5+	INA7	RXD5	4WRT5		21	21		4WRR5	RDX6	OUTA7	TXD6+
TXD5-	INB7	GND	4WRT6		22	22		4WRR6	GND	OUTB7	TXD6-
RC5+	INA8		4WRT7		23	23		4WRR7		OUTA8	RC6+
RC5-	INB8		4WRT8		24	24		4WRR8		OUTB8	RC6-

RXD7+		TXD7	E5		25	25		M5	TXD8		RXD8+
RXD7-			E6		26	26		M6			RXD8-
TC7+		GND	E7		27	27		M7	GND		TC8+
TC7-			E8		28	28		M8			TC8-
TXD7+		RXD7			29	29			RXD8		TXD8+
TXD7-		GND			30	30			GND		TXD8-
RC7+					31	31					RC8+
RC7-					32	32					RC8-

Access interface pin assignment (table 2):

RS422	RS485	4E1	ETH	FV35	A	C	FV35	ETH	4E1	RS485	RS422
TXD1+	TXD1+	INT1	TDN1	RXD1+	1	1	RC1+	TDN2	INR1	TXD2+	TXD2+
TXD1-	TXD1-	OUTT1	TDP1	RXD1-	2	2	RC1-	TDP2	OUTR1	TXD2-	TXD2-
		INT2	RDN1	TCA1+	3	3	GND	RDN2	INR2		
		OUTT2	RDP1	TCA1-	4	4	DSR1	RDP2	OUTR2		
RXD1+	RXD1+	INT3		TXD1+	5	5	CTS1		INR3	RXD2+	RXD2+
RXD1-	RXD1-	OUTT3		TXD1-	6	6	RTS1		OUTR3	RXD2-	RXD2-
		INT4		TCB1+	7	7	DTR1		INR4		
		OUTT4		TCB1-	8	8	CDT1		OUTR4		
TXD3+	TXD3+		TDN3		9	9		TDN4		TXD4+	TXD4+
TXD3-	TXD3-		TDP3		10	10		TDP4		TXD4-	TXD4-
			RDN3		11	11		RDN4			
			RDP3		12	12		RDP4			
RXD3+	RXD3+				13	13				RXD4+	RXD4+
RXD3-	RXD3-				14	14				RXD4-	RXD4-
					15	15					
					16	16					
TXD5+	TXD5+	INT5	TDN5	RXD2+	17	17	RC2+	TDN6	INT5	TXD6+	TXD6+
TXD5-	TXD5-	OUTT5	TDP5	RXD2-	18	18	RC2-	TDP6	OUTT5	TXD6-	TXD6-
		INT6	RDN5	TCA2+	19	19	GND	RDN6	INT6		
		OUTT6	RDP5	TCA2-	20	20	DSR2	RDP6	OUTT6		
RXD5+	RXD5+	INT7		TXD2+	21	21	CTS2		INT7	RXD6+	RXD6+
RXD5-	RXD5-	OUTT7		TXD2-	22	22	RTS2		OUTT7	RXD6-	RXD6-
		INT8		TCB2+	23	23	DTR2		INT8		
		OUTT8		TCB2-	24	24	CDT2		OUTT8		
TXD7+	TXD7+		TDN7		25	25		TDN8		TXD8+	TXD8+
TXD7-	TXD7-		TDP7		26	26		TDP8		TXD8-	TXD8-
			RDN7		27	27		RDN8			
			RDP7		28	28		RDP8			
RXD7+	RXD7+				29	29				RXD8+	RXD8+
RXD7-	RXD7-				30	30				RXD8-	RXD8-
					31	31					
					32	32					

Access interface pin assignment (table 3):

HDSL	SYN232	A	C	SYN232	HDSL
TIP1	TXD1	1	1	TXD2	RING1
		2	2		
	GND	3	3	GND	
		4	4		
	RXD1	5	5	RXD2	
	GND	6	6	GND	
		7	7		
		8	8		
	CLKT1	9	9	CLKT2	
		10	10		
	GND	11	11	GND	
		12	12		
	CLKR1	13	13	CLKR2	
	GND	14	14	GND	
		15	15		
		16	16		
TIP2	TXD3	17	17	TXD4	RING2
		18	18		
	GND	19	19	GND	
		20	20		
	RXD3	21	21	RXD4	
	GND	22	22	GND	
		23	23		
		24	24		
	CLKT3	25	25	CLKT4	
		26	26		
	GND	27	27	GND	
		28	28		
	CLKR3	29	29	CLKR4	
	GND	30	30	GND	
		31	31		
		32	32		

Description about the signal name in the assignment table:

a. Port 2W means two-wire port, such as FXS, FXO, HOT, CRR and MAG.

2WT means 2wire A and 2WR means 2wire B

b. Port 4W means 4-wire with E&M port.

4WTT and 4WTR means 4 wire transmission (input) signal, 4WRT and 4WRR means 4wire receiving (output) signal.

c. Port RS232

TXD is the RS232 output signal from FT-50S (6U) and the RXD is the RS232 input signal to FT-50S (6U).

d. Port V.35

RXD+ is the positive data signal to FT-50S (6U) and the RXD- is the negative data signal to FT-50S (6U). RXD+ and RXD- is a pair of signal.

TXD+ is the positive data signal from FT-50S (6U) and the TXD- is the negative data signal from FT-50S (6U). TXD+ and TXD- is a pair of signal.

TC+ is the positive clock signal from FT-50S (6U) and the TC- is the negative clock signal from FT-50S (6U). TC+ and TC- is a pair of signal.

RC+ is the positive clock signal to FT-50S (6U) and the RC- is the negative clock signal to FT-50S (6U). RC+ and RC- is a pair of signal.

e. Port FV35 is N×64Kbps V.35 interface

P is the positive data signal to FT-50S (6U) and the S is the negative data signal to FT-50S (6U). P and S is a pair of signal.

R is the positive data signal from FT-50S (6U) and the T is the negative data signal from FT-50S (6U). R and T is a pair of signal.

Y is the positive clock signal from FT-50S (6U) and the AA is the negative clock signal from FT-50S (6U). Y and AA is a pair of signal.

V is the positive clock signal from FT-50S (6U) and the X is the negative clock signal from FT-50S (6U). V and X is a pair of signal.

U is the positive clock signal to FT-50S (6U) and the W is the negative clock signal to FT-50S (6U). U and W is a pair of signal.

DSR, CTS and CDT are from FT-50S (6U). RTS and DTR are to FT-50S (6U). these five signals are for handshaking.

f. Port ETH

TDN and TDP are the Ethernet output signal from FT-50S (6U).

RDN and RDP are the Ethernet input signal to FT-50S (6U).

g. Port 4E1

INT and INR are the E1 input signal to FT-50S (6U) and the OUTT and OUTR are the E1 output signal from FT-50S (6U).

h. Port RS422

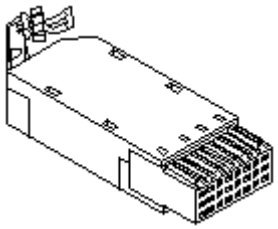
All digital signal line is the same as V35.

i. Port RS485

R(T)XD+ and R(T)XD- are the bi-directional bus of RS485.

5.1.4.6 Cable connector

FT-50S (6U) uses the standard connector to lead the cable to the interface socket, then insert this connector into the corresponding position in the back of FT-50S (6U).



According to the application, the twist pair cable is used for audio ports, and the UTP cable is used for data ports.